

009346-0434  
106120-91228/60

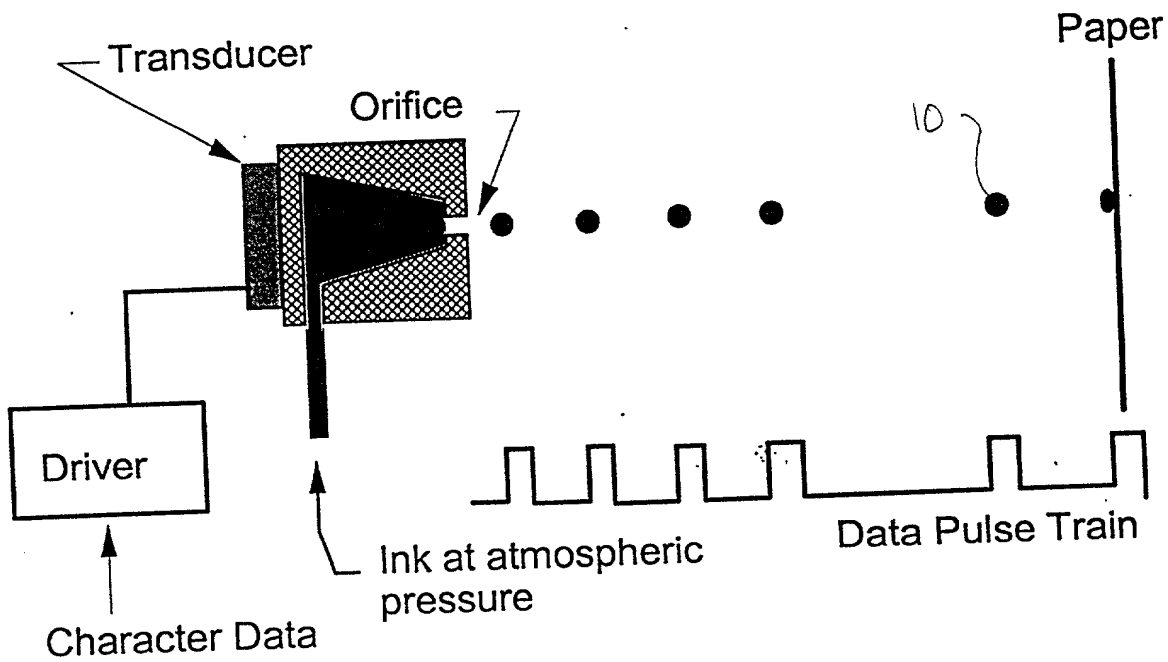


FIG. 1

## Sketch of Droplet Formation & Ejection from Ink-Jet Printing Device

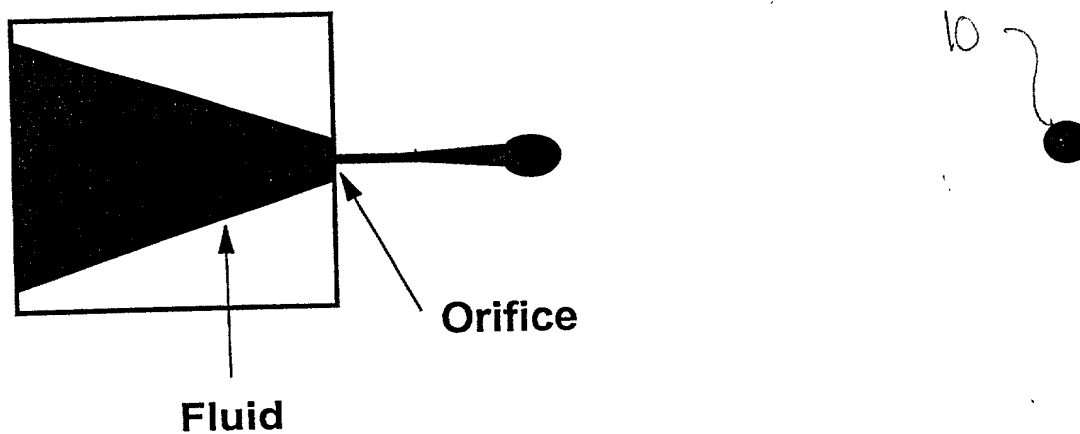


FIG. 2

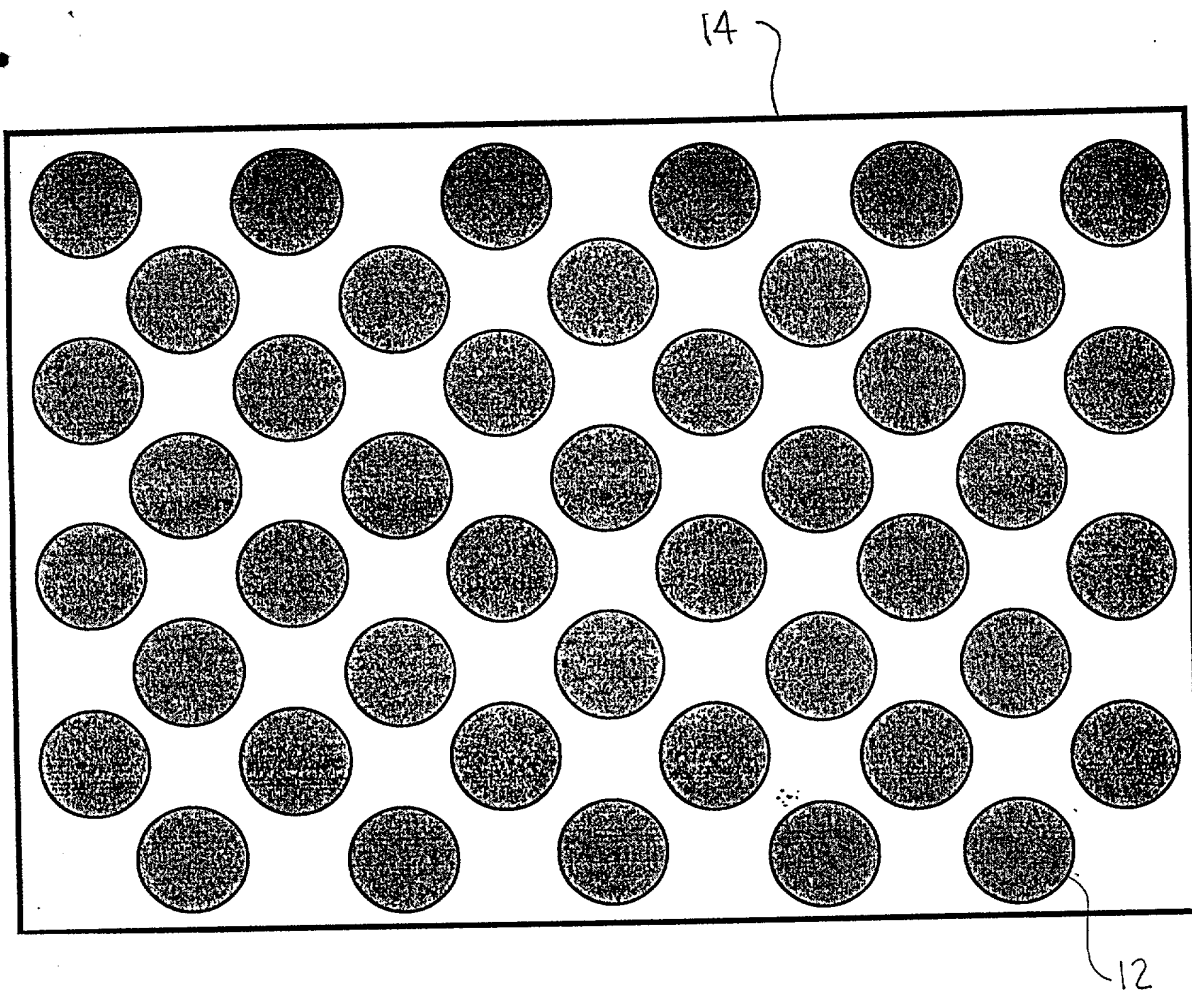
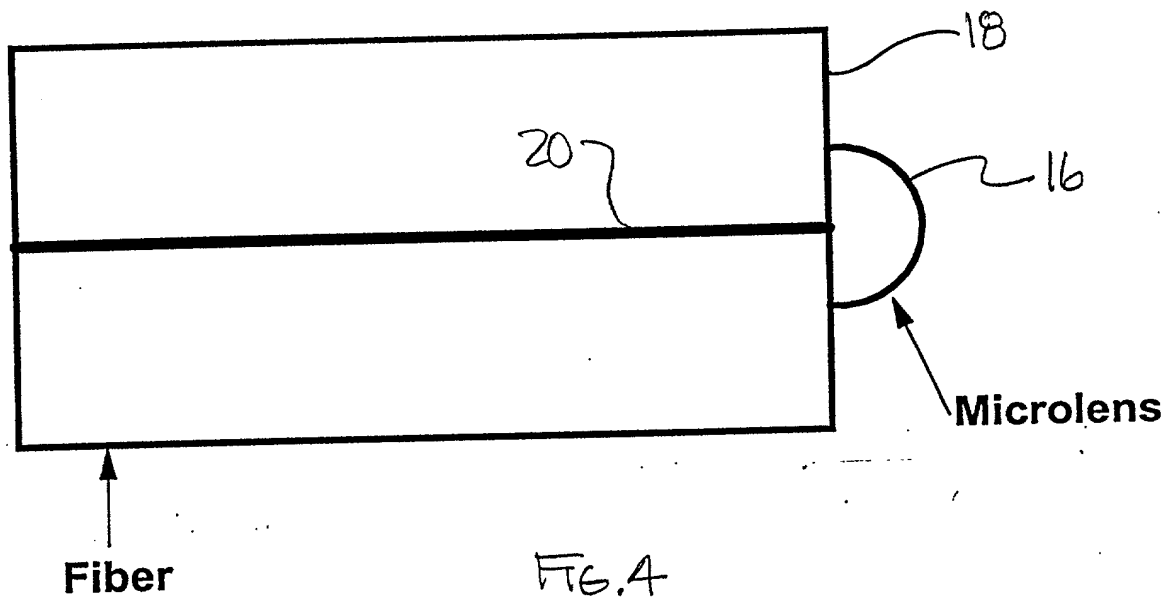


FIG. 3

# Microlens Printed on Tip of Single-Mode Fiber to Increase Numerical Aperture



Print N1 Material (print head #1)

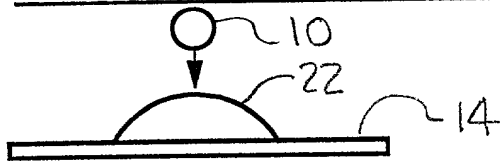


FIG. 5

Single-Index Lens

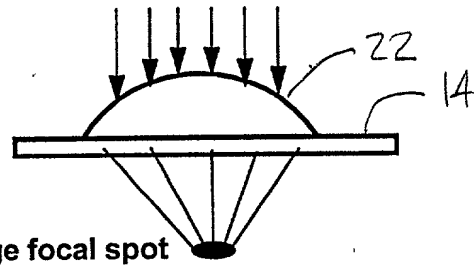


FIG. 8

Print N2 Material (print head #2)

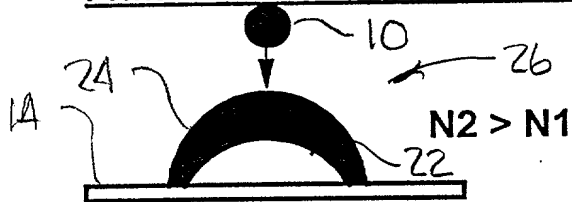


FIG. 6

Gradient-Index Lens

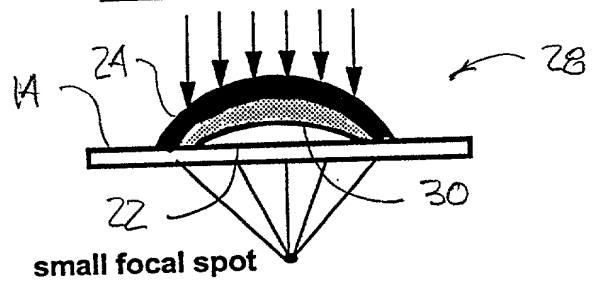


FIG. 9

Diffuse and UV-Cure

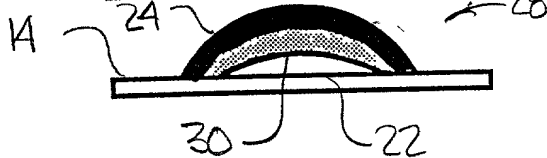


FIG. 7

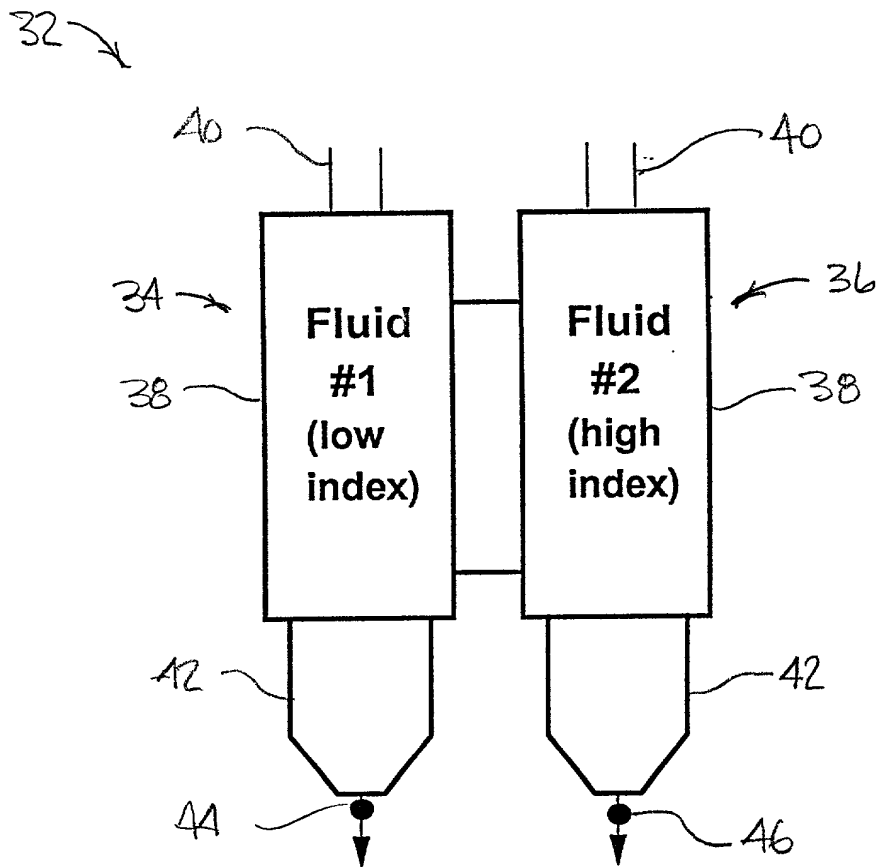


FIG. 10

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FOE F20 91223/60

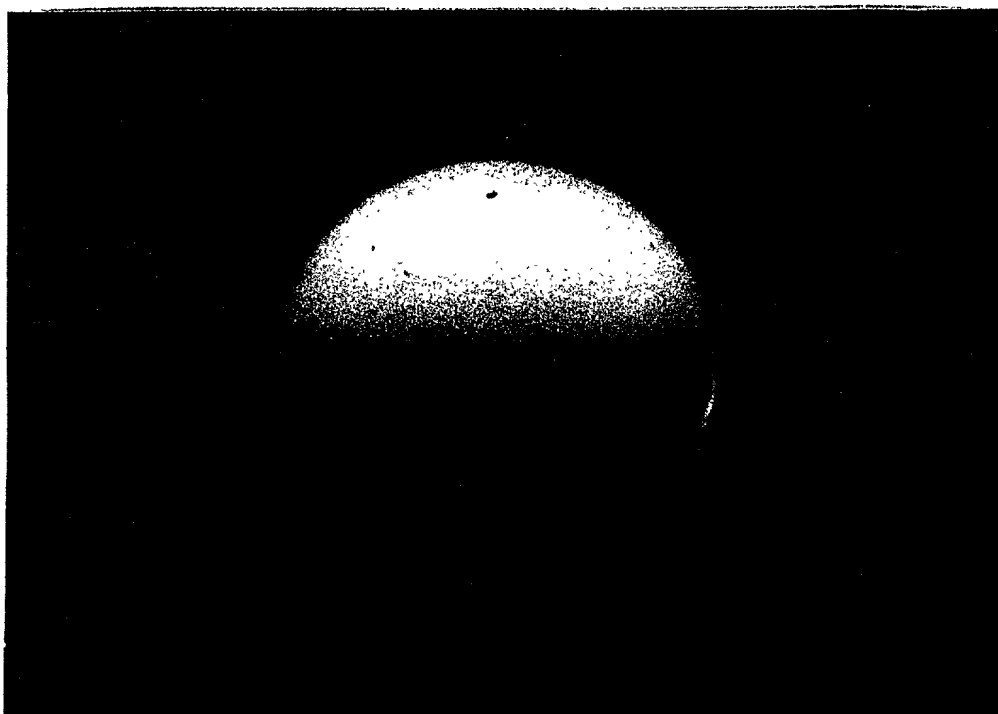


FIG. 11

# LENS MATERIALS ISSUES

## A. PRE-PRINT FLUID PROPERTIES

### MICROJETTING

- VISCOSITY VS. TEMPERATURE
- SURFACE TENSION
- NEWTONIAL BEHAVIOR

### LENS FORMATION

- SUBSTRATE WETTING
- MISCIBILITY OF FLUIDS
- STABILIZATION & CURING
- PROCESS REPEATABILITY

## B. PRINTED LENS PROPERTIES

### OPTICAL PERFORMANCE

- INDEX SPREAD
- GRADIENT SMOOTHNESS
- OPTICAL TRANSPARENCY

### ENVIRONMENT ISSUES

- MECHANICAL HARDNESS
- TEMPERATURE STABILITY
- HUMIDITY STABILITY

FIG. 12